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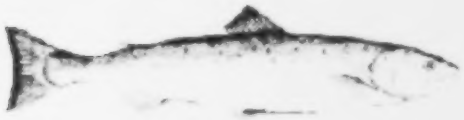
DFO Science
Stock Status Report D2-06



# ATLANTIC SALMON

# INSULAR NEWFOUNDLAND, NORTHWEST COAST SALMON FISHING AREA 14A

***Background***

*Salmon Fishing Area (SFA) 14A contains 22 scheduled salmon rivers. Since 1992 there has been a moratorium on the commercial Atlantic salmon fishery. Also in 1993-96, there was a moratorium on the cod fishery, which should have eliminated salmon by-catches in cod fishing gear. Stocks from this SFA may be exploited in the Labrador and West Greenland commercial fisheries. Rivers assessed in this area include Lomond River, Torrent River and Western Arm Brook (Fig. 1). Historically, rivers in this SFA have been characterized by runs comprised of in excess of 90% small salmon (<63 cm fork length). There has been a general increase in the proportion of large salmon during the moratorium with most of these being repeat spawning grilse. Areas of Lomond and Torrent Rivers have undergone enhancement in previous years. In recent years, Arctic charr have been reared in cages in Portland Creek, a charr hatchery operates in Daniel's Harbour, and a rainbow trout fish-out pond has operated in Spirity Pond, Bonne Bay.*

*Conservation for Atlantic salmon is considered to be a threshold reference point. Conservation requirements are established for individual rivers based on 2.4 eggs per $m^2$ of riverine rearing habitat and 368 or 105 eggs per hectare of lake habitat depending on the river system.*

*The status of stocks is assessed on the basis of the proportion of the conservation egg deposition achieved in a given year and the trends in abundance of various life stages.*

**Figure 1**. Map of Newfoundland showing the location of Salmon Fishing Area 14A and assessment facilities: (1) Western Arm Brook, (2) Torrent River, and (3) Lomond River.

## *The Fishery*

A variety of management options were used to control the recreational fishery in this SFA including hook and retention, hook and release, complete closure, and quotas. For individual rivers: Western Arm Brook was closed to recreational fishing; Torrent River below the fishway was opened to hook and release angling until 750 fish escaped the fishway, after which retention was permitted; Lomond River was closed to recreational fishing above the fishway, but opened to angling with a quota downstream from the fishway. The 1996 quotas for Lomond River, Pincent's Brook, and Watson's Brook were 375, 10, and 50 respectively.

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Recreational catches for both small and large salmon in 1996, were the highest on record. The 1996 retained catch of small salmon increased by 6% over 1995 and 35% over the 1992-95 mean (Fig. 2). Effort in 1996 was the highest recorded.

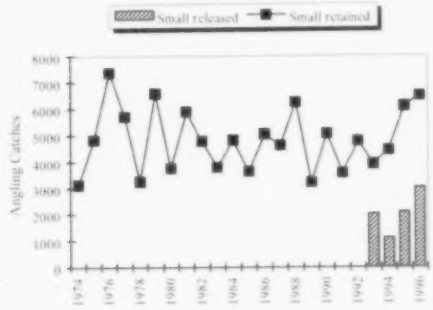


***Figure 2***. Recreational catches of small salmon in Salmon Fishing Area 14A, 1974-96.

## *Environmental Considerations*

In general, water levels and water temperatures were good in 1996.

## *Resource Status*

Returns

Complete counts of small and large salmon are available for Western Arm Brook and above the fishways for Lomond and Torrent Rivers. Returns of small salmon to Lomond and Torrent rivers in moratorium years (1992-96) were higher than in pre-moratorium years; however, returns to Western Arm Brook have been higher in previous years than in 1996. Returns of large salmon comparable to those observed during the moratorium also occurred prior to the moratorium for these rivers. Estimates of total population size of small and large salmon (before any exploitation) in pre-moratorium years were higher for all three rivers than in moratorium years.

Egg depositions relative to conservation

Conservation egg requirements were achieved in all three rivers assessed in this SFA (Fig. 3). Additional information on the individual assessment of each river is provided in the attached Summary Sheets.

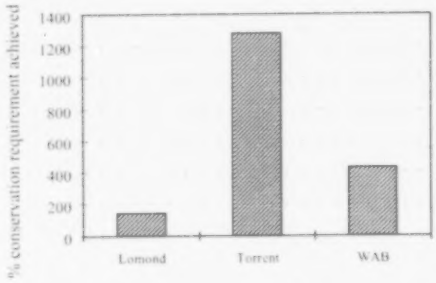


Figure 3. Egg deposition, expressed as a percentage of conservation requirements in Lomond and Torrent rivers and Western Arm Brook in 1996.

## *Outlook*

Short-term

Based on analyses of total population sizes and numbers of small salmon produced per spawner, returns to Lomond and Torrent rivers are expected to increase in 1997 but not in Western Arm Brook. Without including removals for recreational fishing and assuming that natural survival remains the same, then conservation requirements in Western Arm Brook, and Torrent and Lomond rivers are expected to exceed conservation egg requirements in 1997.

Long-term

Adult production should increase beginning in 1998 when the first major returns from spawners in the moratorium years (1992-96) will occur. This expectation assumes that sea survival will remain the same or increase.

## *Management Considerations*

Some SFA 14A rivers have returns far in excess of conservation requirements. Thus, there is a management opportunity for increased harvests on fish surplus to conservation requirements.

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## *References*

Mullins, C.C. 1997. The status of the Atlantic salmon (*Salmo salar* L.) stock of three selected rivers in SFA 14A, Newfoundland, 1996. DFO CSAS Res. Doc. 97/38.

O'Connell, M. F., J. B. Dempson, C. C. Mullins, D. G. Reddin, N. M.Cochrane, and D. Caines. 1997. Status of Atlantic salmon (*Salmo salar* L.) Stocks of the Newfoundland Region, 1996. DFO, CSAS Res. Doc. 97/42.

This report is available:

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**STOCK:** Lomond River (above the fishway) (SFA 14A) **Drainage area:** 470 km$^2$
**CONSERVATION REQUIREMENT:** 1.1 million eggs (~ 557 small salmon) is based on 2.4 eggs/m$^2$ of fluvial area and 368 eggs per ha of lacustrine area.

| Year | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | MIN[1] | MAX[1] | MEAN[1] |
|---|---|---|---|---|---|---|---|---|---|
| **Returns to fishway:** | | | | | | | | | |
| Small | 403 | 435 | 526 | 701 | 1002 | 602 | 1 | 440 | 224 |
| Large | 20 | 80 | 34 | 50 | 95 | 93 | 0 | 50 | 19 |
| **Angling catch below fishway:** | | | | | | | | | |
| Small (retained) | 328 | 357 | 275 | 325 | 343 | 381 | 203 | 650 | 366 |
| Small (released) | . | 24 | 85 | 116 | 190 | 99 | . | . | . |
| Large (released) | 10 | 56 | 36 | 58 | 62 | 49 | 2 | 46 | 18 |
| **Approximate total returns[2]:** | | | | | | | | | |
| Small | 731 | 794 | 816 | 1038 | 1364 | 983 | 259 | 986 | 590 |
| Large | 21 | 86 | 38 | 56 | 101 | 98 | 3 | 75 | 31 |
| **Known removals above fishway:** | | | | | | | | | |
| Small | 0 | 16 | 22 | 0 | 20 | 0 | 0 | 0 | 0 |
| Large | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Spawning escapement above fishway:** | | | | | | | | | |
| Small | 403 | 419 | 504 | 701 | 982 | 602 | 1 | 440 | 224 |
| Large | 20 | 80 | 33 | 50 | 95 | 93 | 0 | 50 | 19 |
| **Conservation requirement % eggs met:[3]** | | | | | | | | | |
| Small + Large | 64 | 121 | 118 | 143 | 187 | 143 | 0 | 74 | 37 |

[1]MIN, MAX, MEAN are for 1974-88.
[2]Approximate because of the occurrence of spawning below the fishway. Large salmon were not retained after 1984.
[3]Egg depositions in 1992 and 1993 are based on biological characteristics for 1993. Egg depositions in 1996 are based on 1992-96 mean for small salmon and 1978-96 for large salmon.

**Methodology:** Fluvial habitat includes 215,600 m$^2$ and lacustrine habitat includes 1,570 ha. Returns to the fishway in 1991 were estimated based on the average count at the fishway in the previous three years. Total returns to the river for 1962-91 were based on counts at the fishway plus angling catches below the fishway. Total returns for 1992-96 were based on counts at the fishway plus retained catches below the fishway and 10% of the released catches. Potential egg deposition was determined from counts of small and large salmon at the fishway and biological characteristics obtained from samples at the fishway and in the recreational fishery.

**Recreational fishery:** The recreational fishery above the fishway has been closed since 1978. The recreational fishery was managed by a river quota of 350 small salmon during 1986-94. The quota increased to 375 small salmon in 1995 and 1996. In 1996, the river was closed to retention angling when the quota was caught on August 13. Angling is currently not permitted above the fishway.

**Data and assessment:** Counts of salmon from the fishway are available from 1962 to 1996 with the exception of 1968-70 and 1989-91 when the fishway was not monitored.

**State of the stock:** The state of the stock should be assessed in terms of the whole river. The area above the fishway represents about 40% of the total river area. Potential egg depositions averaged 37% of the conservation requirement above the fishway in 1974-88 compared to 142% in 1992-95. The potential egg deposition in 1996 was 145% of requirement, 74% above the 1974-88 average, but 29% below 1995. The increases in percentages of conservation requirement met since the commercial fishery moratorium has given a false impression that the status of stocks has improved relative to longterm abundance. Assessments of this river has shown that this is not the case.

**STOCK:** Torrent River (above the fishway), (SFA 14A) **Drainage area:** 619 km$^2$
**CONSERVATION REQUIREMENT:** 1.5 million eggs (~ 562 small salmon is based on 2.4 eggs/m$^2$ of fluvial area and 105 eggs per ha of lacustrine area.

| Year | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | MIN[1] | MAX[1] | MEAN[1] |
|---|---|---|---|---|---|---|---|---|---|
| **Returns to fishway:** | | | | | | | | | |
| Small | 1415 | 2347 | 4009 | 3592 | 5799 | 6923 | 38 | 2815 | 1509 |
| Large | 73 | 169 | 222 | 331 | 611 | 507 | 3 | 523 | 113 |
| **Angling catch below fishway:** | | | | | | | | | |
| Small (retained) | 150 | 477 | 179 | 227 | 331 | 448 | 0 | 340 | 118 |
| Small (released) | . | 75 | 266 | 82 | 369 | 370 | . | . | . |
| Large (released) | 1 | 6 | 15 | 9 | 36 | 20 | 0 | 18 | 3 |
| **Approximate total returns to river[2]:** | | | | | | | | | |
| Small | 1565 | 2832 | 4215 | 3891 | 6167 | 7371 | 96 | 3155 | 1626 |
| Large | 73 | 170 | 224 | 332 | 615 | 510 | 7 | 525 | 115 |
| **Total spawners above fishway:** | | | | | | | | | |
| Small | 1415 | 2347 | 4009 | 3592 | 5799 | 6923 | 138 | 2815 | 1533 |
| Large | 73 | 169 | 222 | 331 | 611 | 507 | 3 | 523 | 113 |
| **Conservation requirement % eggs met:** | | | | | | | | | |
| Small + Large | 176 | 314 | 538 | 530 | 1033 | 1279 | 17 | 360 | 195 |

[1]MIN, MAX, MEAN are for 1974-91.
[2]Approximate because of the occurrence of spawning below the fishway.
[3]Potential egg depositions in 1990-93 were calculated based on the 1985-89 female mean wt. of 1.6 kg for small and 4.13 kg for large salmon. Egg depositions in 1996 are based on 1992-96 mean for small salmon and 1975-96 for large salmon.

**Methodology:** Fluvial habitat includes 516,800 m$^2$ and lacustrine habitat includes 2,323 ha. Potential egg depositions were determined from the spawning escapement of small and large salmon based on a fecundity of 1783 eggs per kg estimated for Western Arm Brook. Biological characteristics used to calculate the potential egg depositions in 1974-84 and 1990-93 were based on the 1985-89 mean female biological characteristics, 1994-95 egg depositions were based on individual year values, and 1996 egg depositions were based on the 1992-96 mean for small salmon and the 1975-96 mean for large salmon. Biological characteristics were from samples collected at the fishway and the recreational fishery. Total returns to the river for 1971-91 were based on counts at the fishway plus angling catches below the fishway. Total returns for 1992-96 were based on counts at the fishway plus retained catches below the fishway and 10% of the released catches.

**Recreational fishery:** As in 1995, the river was not open to retention catch in 1996 until a minimum spawning escapement of 750 salmon had passed through the fishway, but in 1996 the river was open for hook and release only until the 750 salmon had passed through the fishway. The minimum in 1994 and previous years was 1,000 salmon. Angling is currently not permitted above the fishway.

**Data and assessment:** The count of small salmon at the fishway in 1996 was the highest on record, and for large salmon, the second highest. In 1996, the count of small salmon was16% above the count of small salmon in 1995. The count of large salmon in 1996 was 20% below that of 1995.

**State of the stock:** It is estimated that the Torrent River stock has achieved conservation requirement above the fishway every year since 1978. The percentage of requirement achieved in 1996 was 1,279%, 20% above 1995 and 53% above the 1992-95 mean (603%) value. The increases in percentages of requirement met since the commercial moratorium has given a false impression that the status of stocks has improved relative to long-term abundance. Assessments of this river has shown that this is not the case.

**STOCK:** Western Arm Brook, (SFA 14A) **Drainage area:** 149 km$^2$
**CONSERVATION REQUIREMENT:** 0.91 million eggs (~ 287 small salmon) is based on 2.4 eggs/m$^2$ of fluvial area and 105 eggs per ha of lacustrine area.

| Year i | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | MIN[1] | MAX[1] | MEAN[1] |
|---|---|---|---|---|---|---|---|---|---|
| **Returns to counting fence:** | | | | | | | | | |
| **Smolt** | | | | | | | | | |
| Small | 233 | 480 | 947 | 954 | 823 | 1272 | 120 | 1578 | 492 |
| Large | 1 | 8 | 8 | 31 | 33 | 52 | 0 | 4 | 1 |
| **Angling catch below fence:** | | | | | | | | | |
| Small | . | . | . | . | . | . | 0 | 171 | 41 |
| Large | . | . | . | . | . | . | 0 | 2 | 0 |
| **Total Returns to river:** | | | | | | | | | |
| Small | 233 | 480 | 947 | 954 | 823 | 1272 | 233 | 1578 | 533 |
| Large | 1 | 8 | 8 | 31 | 33 | 52 | 0 | 5 | 2 |
| **% Smolt survival[2]:** | | | | | | | | | |
| | 2.2 | 3.6 | 5.3 | 6.8 | 8.9 | 8.4 | 2.1 | 12.1 | 4.4 |
| **Spawning escapement above fence:** | | | | | | | | | |
| Small | 233 | 480 | 947 | 954 | 789 | 1230 | 120 | 1578 | 468 |
| Large | 1 | 8 | 8 | 31 | 30 | 50 | 0 | 4 | 1 |
| **Conservation** | | | | | | | | | |
| **requirement** | | | | | | | | | |
| **% eggs met:** | | | | | | | | | |
| Small + Large | 68 | 151 | 288 | 292 | 285 | 430 | 31 | 287 | 111 |

[1]MIN, MAX, MEAN are for 1974-91.
[2]Based on smolts in year i and total returns of small salmon (adjusted for repeat spawners)in year i+1.

**Methodology:** Fluvial habitat includes 290,000 m$^2$ and lacustrine habitat includes 2,017 ha. Total returns to the river were based on counts at the fence plus angling catches below the fence in 1976-88. Potential egg depositions were calculated from the total spawning escapement of small and large salmon based on 1,783 eggs per kg of females. Potential egg depositions in 1984-93 were based on 1984-93 biologcal characteristics for small and large salmon combined. In 1994-95, egg depositions were based on biological characteristics for each individual year and for 1996, egg deposition was based on mean 1996 female biological characteristics for small salmon and the 1992-96 mean biological characteristics for large salmon.

**Recreational fishery:** The recreational fishery on this river has been closed since 1989 because of high angling exploitation below the counting fence.

**Data and assessment:** Complete adult and smolt counts at the counting fence are available since 1971.

**State of the stock:** Potential egg depositions in 1974-91 averaged 111% of the conservation requirement in 1974-91, and 254% in 1992-95. The level achieved in 1996 was 430%, 34% above the 1995 level and 74% above the average for 1974-91. The increases in percentages of target met since the commercial moratorium has given a false impression that the status of stocks has improved relative to long-term abundance. Assessments of this river has shown that this is not the case.

**Forecast:** The smolt count on Western Arm Brook in 1996 was 4% less than in 1995. Therefore, assuming that the smolt-adult survival rate in 1997 is similar to that in 1996, returns of 1SW salmon in 1997 are expected to be 4% less than the returns in 1996.